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Early Stage of Double Blossom of Dewberry

COMMON DISEASES OF BERRIES

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NEW BRUNSWICK, N. J.

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NEW JERSEY
AGRICULTURAL EXPERIMENT STATIONS
CIRCULAR 88

COMMON DISEASES OF BERRIES[1]

The growing of berries of various kinds is one of the important New Jersey agricultural industries. Unfortunately, these crops are subject to many diseases which tend to reduce the crops and in some cases actually destroy the plantings. Therefore, this circular has been prepared, describing the diseases and giving the latest known remedies.

BLACKBERRIES, RASPBERRIES AND DEWBERRIES

CROWN GALL (*Bacterium tumefaciens* S. & T.) (fig. 1.). This disease is very common and is most destructive on red raspberries. It appears during the summer as more or less spherical soft, white, slightly roughened knots on the roots and sometimes on the canes, as much as 18 inches above the ground. These galls turn brown with age and decay. The seriousness of this disease varies with the varieties and with the soil conditions. It is responsible, more than any other one cause, for the great reduction of the berry-growing industry on the Delaware-Maryland Penninsula and is the cause of much greater losses in New Jersey than are attributed to it.

This disease also attacks the apple, pear, quince, peach, plum, cherry and many other plants. It spreads very readily from the berries to the peach and the practice of setting peach orchards on old berry fields and of using berries as inter-row crops in peach orchards is very likely to give disastrous results.

In setting a new berry field, the grower should secure his new plants from the most healthy plants possible. They should be fertilized with heavy applications of nitrate of soda or poultry manure, which is more satisfactory than any other form of manure. Individual diseased plants should be removed as soon as detected and destroyed by burning.

ANTHRACNOSE (*Glœosporium venetum* Speg.) (fig. 2). This is a fungous disease which is especially severe on the canes, and also attacks the other parts of the plant above the ground It first appears on the young canes and spreads throughout the season. It starts as small, more or less circular spots which are purplish in color. As they increase in age they become elliptical and the centers become grayish. They frequently unite, causing irregular blotches. In severe cases the stems are cracked.

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[1]Prepared December 1, 1917, by Mel. T. Cook, Ph. D., Plant Pathologist, New Jersey Agricultural Experiment Station.

The old canes should be cut out and burned and the plants sprayed with Bordeaux mixture before the leaves appear and again before blossoming. Or, lime and sulfur (1 part in 9 parts of water) may be used for the first spray and Bordeaux mixture for the second.

Fig. 1. Crown gall on red raspberry; natural size. (From N. J. Agr. Exp. Sta. Circ. 34.)

ORANGE RUST [*Gymnoconia interstitialis* (Schlt.) Lagerh]. This is a very common fungous disease which appears in the early spring, producing large, bright orange-colored powdery areas on the underside of the leaves and in severe cases causing them to become rolled and dwarfed. It also attacks the canes, causing them to split and frequently extends down into the roots. It is sometimes very destructive. The only satisfactory remedy consists of digging out

and burning the infected plants as soon as the disease is discovered. It is also advisable to destroy the diseased wild plants in the vicinity.

YELLOW LATE RUST [*Kuehneola Albida* (Kuehn) P. Magn.]. This is a fungous disease which is occasionally found in this state. It causes bright yellow blister-like elevations on stem and leaf (pustules) at about blossoming time or later in the season. It is of very little importance.

Fig. 2. Anthracnose on raspberry.
(Photo by R. F. Poole.)

DOUBLE BLOSSOM (*Fusarium rubi* Wint.) (fig. 3 and 4). This is a fungous disease which is most severe on dew berries, especially the Lucretia and Black Diamond. It is more or less common on blackberries. The fungi winter over in the buds, causing them to swell a little in advance of the healthy buds and to give rise to a number of weak, deformed shoots bearing a few worthless berries. Some growers suppose these diseased blossoms to be staminate or male flowers, but this is not true. The fungus matures in these diseased blossoms and produces great numbers of minute spores. These are carried by the wind and infest the buds which are being formed for the next year.

Spraying is of little or no value in the control of this disease; but it can be very readily controlled by the persistent picking of the diseased buds just as the young leaves are coming out. The diseased buds can be very readily detected at this time and the work done with very little expenditure of time. If this precaution is taken there will be very few new infections and the number of diseased plants will be greatly reduced. If this treatment is fol-

lowed the Lucretia will live two or three years longer than otherwise.

LEAF SPOT *(Septoria rubi* Westd.*)* This is a fungous disease causing small, grayish spots on the leaves. It is very abundant but not considered serious.

CANE BLIGHT [*Leptosphæria coniothyrium* (Fckl.) Sacc.] (fig. 5). This fungous disease of raspberries and roses is becoming more and more prevalent and is the cause of rather heavy losses. Usually the first evidence of the presence of this disease is the wilting and dying of the plants. The bark peels and the wood cracks. There are no very satisfactory methods of control. In case of severe outbreaks it is sometimes advisable to destroy all the plants. In case of mild attacks the diseased plants should be cut out and destroyed as soon as detected.

Fig. 3. Double blossom of dewberry.
(From N. J. Agr. Exp. Sta. Ann. Rpt. 1913.)

SPUR BLIGHT *(Glomerella rubicola).* This is a fungous disease of raspberries, which attacks the leaves, working down the petioles, forming a bluish brown canker on the cane at the point of union of petioles and cane. These cankers may extend for a considerable distance up and down the cane, causing the bark to crack and the leaf to droop and fall. In many cases the petiole adheres to the cane. It is usually confined to the base of the plant. It weakens the plant and causes a reduced yield. It can be controlled by spraying with Bordeaux mixture It is comparatively rare in New Jersey. Thus far it has proved of very little importance.

YELLOWS (Cause unknown) (fig. 6.). This is a peculiar disease of raspberries which is sometimes confused with cane blight. The diseased plants are dwarfed and bushy, the leaves small and tending to roll upward. There is no satisfactory treatment other than the destruction of the diseased plants.

GOOSEBERRIES AND CURRANTS

COMMON LEAF SPOT [*Mycosphaerella grossulariæ* (Fr.) Lind.]. This is very common fungous disease of currants and gooseberries which appears in June, causing numerous small brown spots on both surfaces of the leaves. These spots increase in size until about one-eighth inch in diameter, become grayish in the center, frequently unite and develop minute black fruiting bodies. The leaves fall prematurely.

Fig. 4. Double blossom on dewberry; slight infection.

It can be controlled by spraying with Bordeaux mixture or lime-sulfur soon after the opening of the leaf buds and again after the harvesting of the fruit. It can also be controlled by dusting with a mixture of 9 parts of sulfur dust and 1 part of lead arsenate.

ANTHRACNOSE *(Pseudopeziza ribes* Kleb.*)*. This is a fungous disease which attacks the older leaves, causing circular brown to black spots on the upper surfaces. The infected leaves turn yellow and fall prematurely. It also causes very small, fly-speck like spots on the fruits, and attacks the canes, causing elongated spots one-fourth to one-half inch in length. It can be controlled by spraying with Bordeaux mixture or lime-sulfur solution 1 to 40

or 1 to 50. The first treatment should be given before blooming. It is advisable to give another treatment after harvesting the crop. The fungous winters over on the leaves and therefore it is desirable, when possible, to burn or plow them under.

ANGULAR LEAF SPOT [*Cercospora angulata* (Wint.)]. This is a fungous disease that has received but little attention. The spots are angular or circular, about one-sixteenth inch in diameter, pale above and brownish below. It can be controlled by the spraying methods previously recommended.

Fig. 5. Cane blight of raspberry; plant almost dead. (Photo by R. F. Poole.)

POWDERY MILDEW [*Sphærotheca mors uvæ* (Schus.) B. & C.] This is a fungous disease that is of very little importance in the United States. The diseased berries are covered with a felty, moldy, brownish growth and frequently crack and decay. The leaves and young growth are covered with a whitish growth which also becomes brown with age. The infested parts are usually dwarfed.

This disease can be controlled by spraying with potassium sulfide (liver of sulfur), 1 ounce in 2 or 3 gallons of water, or lime-sulfur solution, 1 to 40.

BLISTER RUST [*Cronartium ribicola* (Fisch. von Waldh.)]. This disease is of the very greatest importance owing to the fact that it has an alternating stage on the white pine and other 5-leafed

pines. It is most severe on the black currants and is very destructive to the pines.

Fig. 6. Raspberry yellows.
(Photo by R. F. Poole.)

The rust pustles on the leaves of the currants and gooseberries are of two kinds; small yellowish pustules appearing early in June and throughout the remainder of the season, and brownish, felt-like

pustules appearing later in the season. In severe cases the leaves fall prematurely. The spores from the yellowish pustules reinfect the currants and gooseberries, but the spores from the felty pustules cause an infection of the pines.

The disease may persist in the pines for an indefinite period before making its appearance. It first appears on the pines during the months of April, May and June, causing spindle-shaped swellings of the branches and also the trunks of young trees. Blister-like pustules are formed and a little later the spore pustules, containing masses of orange-colored spores, break through the bark. These spores will not reinfect the pines but pass to the currants and gooseberries and cause the symptoms previously described. This is one of the most destructive diseases of the pines and every possible precaution should be made to control it. Pines should not be set near currants and gooseberries, diseased trees should be destroyed; and diseased currants and gooseberries should be defoliated and the leaves burned.

CANE BLIGHT [*Botryosphæria ribis* (G. & D.)]. This is a fungous disease of currants only, which causes the plants to wilt and die. It is very destructive and has been the cause of some heavy losses in New Jersey. Heavy pruning is said to be advantageous, but there is no strictly satisfactory remedy other than the absolute destruction of diseased plants.

STRAWBERRIES

LEAF-SPOT [*Mycosphærella fragariæ* (Schu.) Lind.]. This is a very common fungous disease which attacks the leaves and parts of the flower. It causes very small deep purple or reddish spots which are most noticeable on the upper surface of the leaves. They increase in size and the central part becomes brownish and then grayish. Fully developed spots one-eighth to one-fourth inch in diameter are frequently grayish and surrounded by brownish and purplish zones. The spots frequently unite, forming large irregular blotches.

This disease is the cause of greater losses than is fully appreciated. It can be held in check by a careful selection of plants; setting on well drained soil and spraying with Bordeaux mixture before the blossoms open. Mowing and burning after harvesting is frequently advantageous.

POWDERY-MILDEW [*Sphærotheca humuli* (Fries.) Burr]. This is a fungous disease which is sometimes the cause of heavy losses. It attacks the leaves causing them to curl as though suffering from drought. An examination of the lower surface will reveal the growth of the white powdery fungus. It also attacks the berries, causing them to be small, tasteless and therefore of no value. There is no known remedy, but the application of sulfur dust would probably prove advantageous.

ROTS due to fungi are the causes of heavy losses in the field and during shipment, especially during warm, rainy weather. The character of these rots and their dependence on the weather make treatments impracticable. The fruit should be carefully sorted and the rotten berries burned each day. Avoid bruising the fruit and, if possible, cool quickly.

WINTER INJURY. A very common form of winter injury in New Jersey is due to alternate freezing and thawing which causes the plants to heave and injures the root system. These plants will blossom and produce fruit which they cannot mature. They usually begin dying just about the time or a little before the fruit begins to ripen.

CRANBERRIES

SCALD OR EARLY ROT *(Guignardia vaccinii* Shear*)*. This is a fungous disease which attacks all parts of the plant but is most prominent on the berries. It is the most widely distributed and most destructive disease of cranberries. In New Jersey it starts on the berries as small, watery spots which enlarge and frequently cover the entire berry, causing it to soften and turn brown. The term "scald" very aptly describes this disease during a considerable part of its progress. The fruiting bodies appear in the form of dark concentric rings. Flowers and young fruit die and become very much shriveled.

The disease can be controlled by frequent spraying with Bordeaux mixture, to which should be added 4 pounds of fish-oil soap for each 50 gallons of the mixture. The growing of cranberries is such a highly specialized industry that the grower who wishes to use this treatment should make a study of the methods of application on some bog in which the treatment is in use.

ANTHRACNOSE [*Glomerella cingulata* (Stoneman) Sp. & Von S. Var. *Vaccinii* Shear]. This is a very widely distributed rot disease which can be controlled by the same treatment as scald.

ROT [*Acanthorhynchus vaccinii* (Shear).] This is a fungous disease which is very easily confused with the scald. It can be controlled by the same treatment as scald.

FALSE BLOSSOM (Cause unknown). This is a very peculiar disease. In its simplest form the flower pedicles are erect, the calyx lobes enlarged, greenish and leaf-like, the petals shortened, broadened and slightly reddish or greenish. In extreme cases the floral organs are greenish and leaf-like whorls on an extended axis. The diseased plants also produce numerous, slender, weak, lateral branches which do not flower.

Plants should not be introduced from a locality where the disease is known to exist. Diseased plants should be destroyed.

GALL *(Synchytrium vaccinii* Thomas*)*. This disease appears in small reddish galls on all parts of the plant above ground. It is not often that this disease is serious but when abundant the most satisfactory treatment is the thorough drainage of the bog.

END ROT *(Fusicoccum putrifaciens)*. This is a new fungous disease which attacks either end of the fruit, causing slightly yellowish or brownish yellow, watery discolorations. It is most prevalent about picking time and also causes considerable loss in storage. It can be controlled by spraying with Bordeaux mixture.

Other Circulars on Plant Diseases

The following is a list of circulars on plant diseases which are available for free distribution. Copies can be obtained by writing to the Agricultural Experiment Station, New Brunswick, N. J.

No.

29. Peach Leaf-Curl.
35. Some Diseases of Nursery Stock.
48. Bordeaux Mixture.
51. Diseases of Grains and Forage Crops.
52. Common Diseases of the Pear.
53. Potato Diseases in New Jersey.
55. Common Diseases of the Grape.
68. Common Diseases of Cucumbers and Melons.
71. Diseases of Tomatoes.
80. Common Diseases of Apples, Pears and Quinces.
81. Common Diseases of Peach, Plum and Cherry.
84. Common Diseases of Beans and Peas.
89. Common Diseases of Garden Vegetables and Truck Crops.